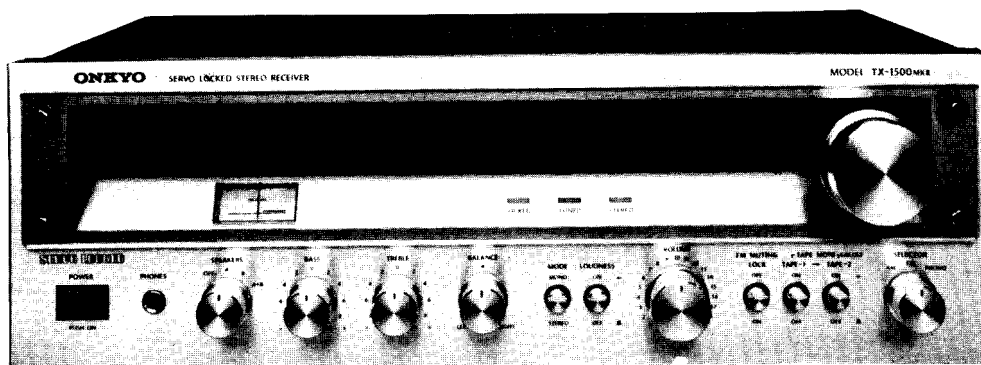


# ONKYO® SERVICE MANUAL

## SERVO LOCKED STEREO RECEIVER MODEL TX-1500MKII



**ONKYO®**  
**AUDIO COMPONENTS**

## SPECIFICATIONS

### Amplifier section

Power Output	17 watts per channel, min. RMS, at 8 ohms both channels driven, from 20 Hz to 20 kHz, with no more than 0.3% total harmonic distortion.
	20 watts per channel, min. RMS, at 8 ohms both channels driven, 1 kHz, 0.3% total harmonic distortion.
Total harmonic distortion	0.3% at rated power
	0.1% at 1 watt output
IM Distortion	0.3% at rated power
	0.1% at 1 watt output
Damping Factor	30 at 8 ohms
Frequency Response	20 – 20,000 Hz ( $\pm 1$ dB)
Sensitivity and Impedance	PHONO: 2.5 mV 50 kohms TAPE PLAY: 150 mV 50 kohms TAPE REC: 150 mV 3 kohms (PHONO)
Phono Overload	100 mV RMS at 1 kHz 0.3% THD.
Tone Control Bass	$\pm 12$ dB at 100 Hz
Treble	$\pm 10$ dB at 10 kHz
Signal to Noise ratio	PHONO: 65 dB (IHF C network) 85 dB (IHF A network, 10mV input) TAPE: 90 dB (IHF C network) 95 dB (IHF A network)
RIAA Curve deviation	$\pm 0.8$ dB 30 Hz – 15 kHz
Loudness (–30 dB)	+9 dB at 40 Hz +6 dB at 20 kHz

### Tuner section

Tuning Range	FM: 88–108 MHz AM: 530–1605 kHz
Usable Sensitivity	FM mono: 12.4 dBf, 2.3 $\mu$ V FM stereo: 19.2 dBf, 5 $\mu$ V AM: 25 $\mu$ V

50 dB Quieting Sensitivity	FM mono: 18.3 dBf, 4.5 $\mu$ V FM stereo: 39.2 dBf, 50 $\mu$ V
Intermediate Frequency	FM: 10.7 MHz AM: 455 kHz
Capture Ratio	FM: 1.5 dB
Image Rejection ratio	FM: 45 dB AM: 40 dB
IF Rejection ratio	FM: 80 dB AM: 30 dB
Signal to Noise ratio	FM mono: 65 dB FM stereo: 60 dB AM: 40 dB
Alternate Channel Att.	FM: 60 dB
AM Suppression ratio	FM: 50 dB
Harmonic Distortion	FM mono: 0.25% AM: 0.9%
Frequency Response	FM: 30–15,000 Hz $\pm 1.5$ dB
Stereo Separation	FM: 35 dB at 1 kHz 30 dB 100–10,000 Hz
Muting Level	FM: 3 $\mu$ V, 14.7 dBf
Stereo Threshold	FM: 3 $\mu$ V, 14.7 dBf
Servo Lock Lamp Level	FM: 3 $\mu$ V, 14.7 dBf
Spurious Rejection	FM 1/2 IF: 78 dB
Sub Carrier Suppression	FM: 40 dB
Tuning Meter	Signal strength meter
<b>General</b>	
Power Supply Rating	AC 120 V 60 Hz
Dimensions	438(W) x 147(H) x 315(D) mm 17-1/4" x 5-13/16" x 12-3/8"
Weight	7.3 kg. (16.1 lbs.)

Specifications and features are subject to change without notice.

## PRECAUTIONS

- FOR CONTINUED PROTECTION AGAINST FIRE HAZARD, REPLACE ONLY WITH SAME TYPE AND SAME RATING FUSE.

DESCRIPTION	PARTS NO.	SPECIFICATIONS
AC FUSE	252044	2A (ST-6) UL
SPEAKER PROTECTION FUSE	252025	2.5A-T

- Always disconnect the chassis from power line cord when soldering. Turning the power switch OFF is not enough. Power line leakage passing through the heating element may destroy the transistors.

## SERVICE PROCEDURES

### 1. REMOVAL OF THE FRONT PANEL

- 1) Remove four screws holding the ampli. cover and side bracket.
- 2) Remove two screws holding the ampli. cover and back panel.
- 3) Pull out the control knobs.
- 4) Remove four screws holding the front panel and the front bracket.

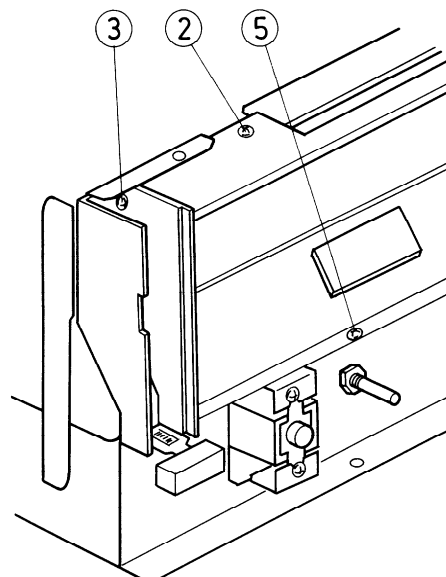
### 2. REMOVAL OF THE DIAL GLASS

Remove four screws holding the dial glass and the front panel.

NOTE: The dial glass has been mounted by applying an 800 gr torque to the screws. If the dial is removed during repairs, and a torque driver is available, apply 800 gr torque to the screws when replacing. If however, torque driver is not available, simply tighten the screws by hand. When replacing the dial glass, insert all relevant component parts in accordance with the cross sectional diagram.

### 3. REPLACING THE METER

- 1) Remove the top cover and front panel.
- 2) Remove the two screws securing the illumination bracket and front bracket.
- 3) Remove the two sets of screws securing the left and right dial plate frame and front bracket.
- 4) Remove the dial plate from the drive shaft.
- 5) Remove the three screws securing the front bracket and back plate.
- 6) The top and bottom side of the meter cover the fastened to the back plate by adhesive tape. Remove this tape, taking care not to jar knock the meters.

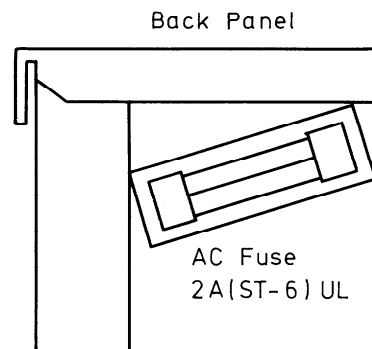


### 4. SENSOR SWITCH

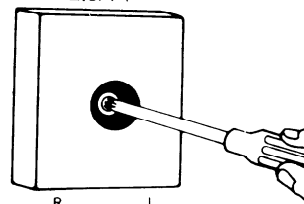
For matching the automatic FM tuning servo locked system to the various operating conditions. Set to LOW initially and switch to HIGH if the TUNED lamp does not turn off as soon as the tuning knob is touched.

### 5. REPLACING THE AC FUSE

- 1) Remove the bottom board.
- 2) Replace the AC fuse with same type and same rating fuse.



SPEAKER FUSE  
2.5A-T



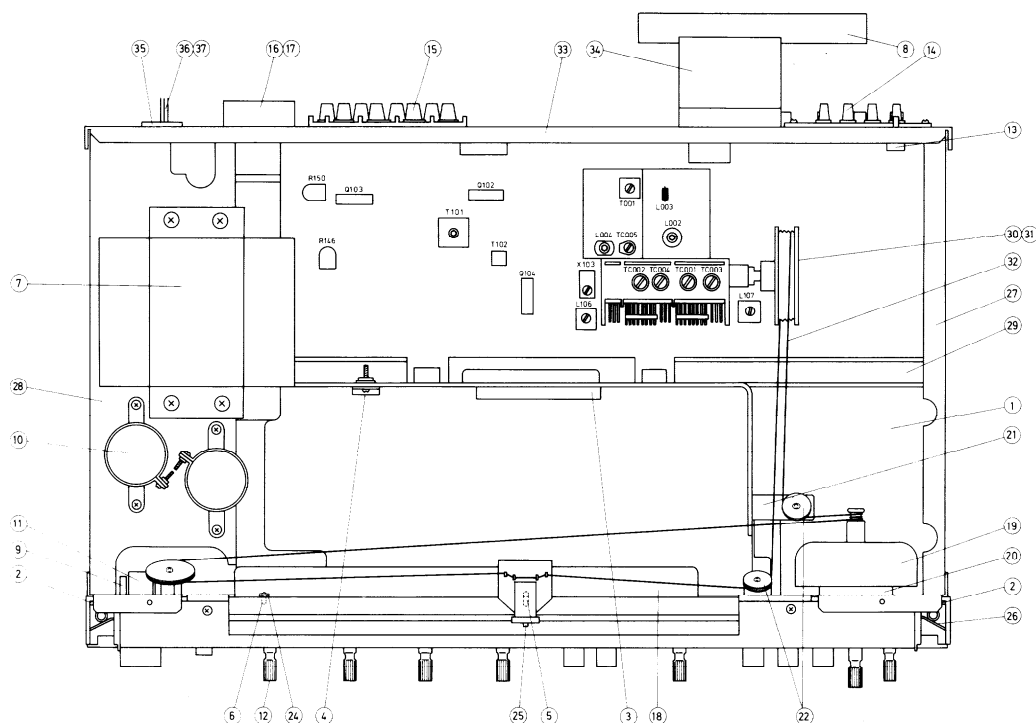
### 6. REPLACING THE SPEAKER PROTECTION FUSE

- 1) Remove a screw holding the cover and back panel and the cover.
- 2) Replace the fuse with same type and same rating fuse.

### 7. REPLACING THE INDICATOR LAMPS

All indicator lamps are linked to their respective lamp covers. So when replacing remove the defective lamp from the front bracket with its cover in place.

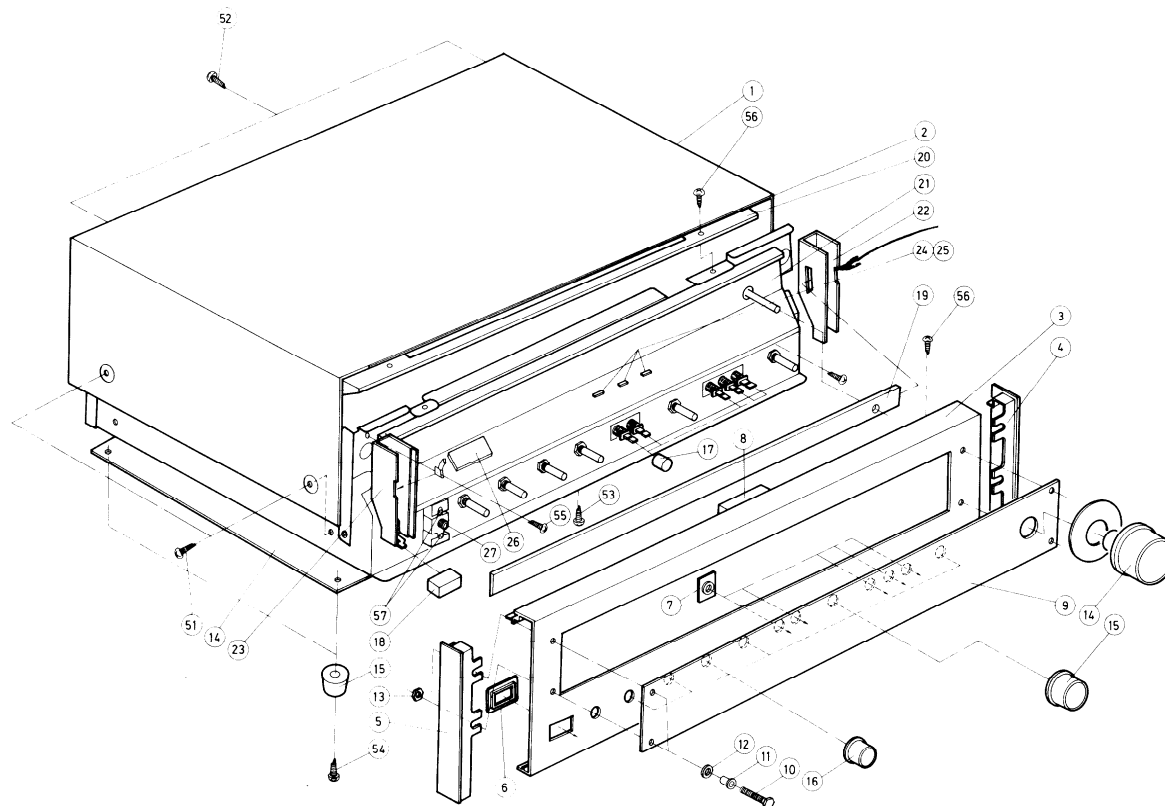
## COMPONENT LOCATION



### COMPONENT LOCATION – PARTS LIST

REF. NO.	CIRCUIT NO.	PARTS NO.	DESCRIPTION
1.	U1	13679507	NAAR-507, Tuner and ampli. p.c.b.
2.	U2	13719574	NAPL-474, Dial illumination p.c.b.
3.	Q501	222016	STK-459, Power ampli. IC
4.	Q901	2200113 or 2200020	2SD234(O) or (Y), Lipple filter transistor
5.	PL801	210044	PL8V 0.05AW-3, Pointer lamp
6.	PL802	210041	PL8V0.15AW-2, Meter illumination lamp
7.	T901	230251	NPT-644D, Power transformer
8.	L105	232063	NMA-1008, AM bar antenna
	L105	232067	NMA-1011, AM bar antenna
9.	C901	3504012	0.01 $\mu$ F, 125V, UL capacitor
10.	C902, C903	3504081	4,700 $\mu$ F, 35V, Elect. capacitor
11.	S901	25035047	NPS-111-L12P, Power switch
12.	S809	25030074	NRS-144-30Y, Speaker selector switch
13.	S807	250142	NSS-2225, Hum sensor switch
14.	P805	25060035	NTM-4PRMC06, Antenna terminal
15.	P806, P807	25060026	NTM-4PRMN03, Speaker terminal
16.	F501a, F601a	25050004	Fuse holder with cover
17.	F501, F601	252025	2.5A-T, Speaker protection fuse
18.	A001	27110062	Front bracket
19.	A002	27205014	Drive shaft
20.	A003	27300071	Bearing
21.	A004	27140218	Bracket for dial pulley
22.	A006	27185002	DP-16N, Dial pulley
23.	A005	27185001	DP-26N, Dial pulley
24.	A008	27300114	Lamp cover
25.		13679701	Pointer
26.	A018	27140203	Spring
27.	A034	27115018B	Side bracket
28.	A035	27130104A	Bracket for power transformer
29.	A036	27160041A	Radiator
30.	A041	27200019	Dial drum
31.	A042	273803	SP-14A, Dial drum spring
32.	A043	273903	Stringing
33.	A048	27120124A	Back panel
34.	A049	27190024	Antenna holder
35.	P901	25050032	S-I6444-01, AC outlet
36.	W901	253099	AS-UC3, Power supply cord
37.		270025	SP-3P-4, Strainrelief
	F901a	250143	FF-1S4, Fuseholder
	F901	252044	2A(ST-6)UL, AC fuse

## EXPLODED VIEW



## EXPLODED VIEW – PARTS LIST

REF. NO.	PARTS NO.	DESCRIPTION
1.	28184042	Top cover
2.	28140024	Cushion
3.	13679121	Front panel ass'y
4.	28125052	End cap (R)
5.	28125053	End cap (L)
6.	27267030	Guide for power switch
7.	27267026	Guide for push switch
8.	28140105	Cushion
9.	28191028	Dial glass
10.	84334015	M4X15(Cr), Hexagone volt
11.	27270017A	Spacer
12.	870059	Washer
13.	863140	N-4F-N, Nut
14.	28320247	Tuning knob
15.	28320238	Volume control knob
16.	28320237	Tone control knob
17.	28320239	Push switch knob
18.	28320171A	Power switch knob
19.	28130068A	Dial Plate
20.	27240017A	Dial illumination bracket
21.	28133010	Back plate
22.	27215036	Dial frame (R)
23.	27215037	Dial frame (L)
24.	28198512	Facet
25.	210040A	PL12V0.03AW-3, LOCKED/TUNED/STEREO indicator lamp
26.	243090	NIND-0500S90, Signal strength meter
27.	25045018	LJ-100-H, Stereo headphone jack
28.	27170045	Bottom board
29.	27175009	T-C, Leg
51.	838440109	4TTB+10C(BC)
52.	834430102	3STS+10BQ(BC)
53.	831130062	3STW+6BQ
54.	831130122	3STW+12BQ
55.	831130082	3STW+8BQ
56.	834130062	3STS+6BQ
57.	801105	8W3P+6FN

## ALIGNMENT PROCEDURES

### INSTRUMENTS REQUIRED

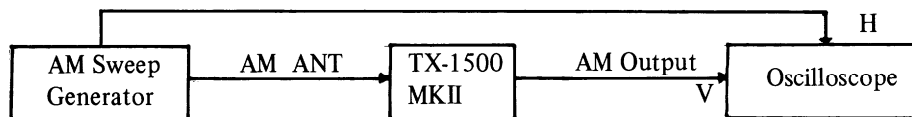
1. AM Sweep Generator
2. AM and FM Signal Generator
3. Vacume Tube Voltage Meter (VTVM) AC, DC
4. Oscilloscope
5. Distortion Analyzer
6. Stereo Modulator
7. Frequency Counter

### GENERAL ALIGNMENT CONDITIONS

1. Signal input should be kept as low as possible.
2. Standard modulation is 400Hz 30% (AM), 1 kHz 100% (FM MONO) pilot 9% sub and main 91% (FM STEREO).
3. Standar knob position  
 SPEAKER . . . . . A  
 BASS, TREBLE & BALANCE . . . Center  
 MODE . . . . . Stereo  
 LOUDNESS, MUTING LOCK . . . OFF  
 TAPE 1, 2 . . . . . OFF (source)

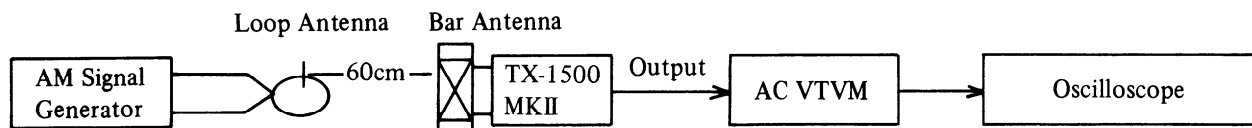
#### (1) AM IF ALIGNMENT

1. Set SELECTOR switch to AM.
2. Set radio dial to quiet point.



Set signal	Adjust	Oscilloscope	Remarks
455 kHz	X103	Maximum Symmetrical Response	Usually not necessary to adjust

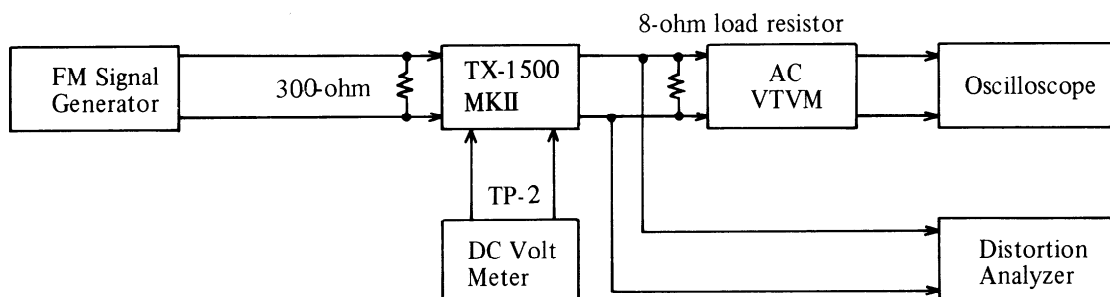
#### (2) AM RF ALIGNMENT



Step	Set Signal	Set Radio Dial	Adjust	VTVM reading	Remarks
1	515 kHz 400 Hz 30 %	Lower end (515 kHz)	L106	Maximum	Repeat steps 1 and 2 as necessary
2	1680 kHz 400 Hz 30%	Upper end (1680 kHz)	TC002	Maximum	
3	600 kHz 400 Hz 30%	600 kHz	L105 or L107	Maximum	Adjust with L105 when L107 is not used. Repeat steps 3 and 4 as necessary
4	1400 kHz 400 Hz 30 %	1400 kHz	TC001	Maximum	

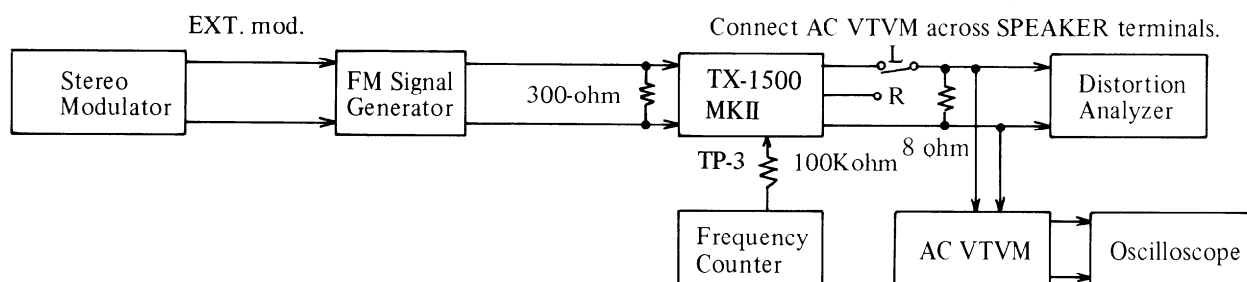
#### (3) FM FRONT END ALIGNMENT

1. Set SELECTOR switch to FM.
2. Push MUTING switch to off.
3. Connect FM Signal Generator to 300-ohm antenna terminals.
4. Connect DC Voltmeter to TP-2 terminals.

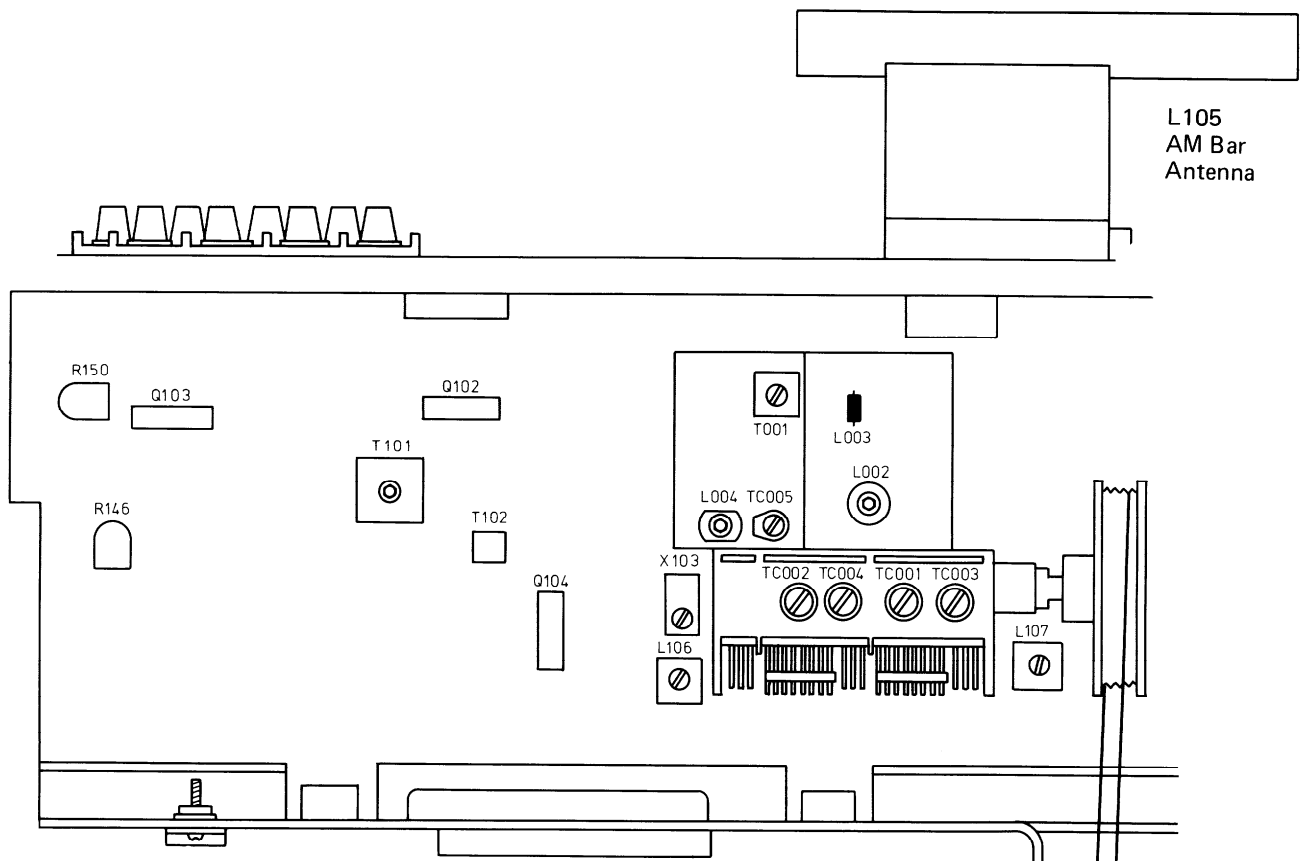


Step	FM Signal Generator	Dial to set	Adjust	Output Indicator	Adjust for	Remarks
1	No signal	Quiet Point	T101 Bottom	DC Voltmeter	0V	Repeat Steps 1 and 2 as necessary
2	98MHz 65dBf(60dB) 1kHz 75kHz devi.	98MHz	T101 Top	Distortion Analyzer	Minimum	
3	90MHz 65dBf(60dB) 1kHz 75kHz devi.	90MHz	L004	DC Voltmeter	0V	Repeat Steps 3 and 4 as necessary
4	106MHz 65dBf(60dB) 1kHz 75kHz devi.	106MHz	TC005			
5	90MHz 20dBf(15dB) 1kHz 75kHz devi.	90MHz	L001 L002	AC VTVM or Oscilloscope	Maximum	Repeat Steps 5 and 6 as necessary
6	106MHz 20dBf(15dB) 1kHz 75kHz devi.	106MHz	TC003 TC004		Maximum	
7	98MHz 65dBf(60dB) 1kHz 75kHz devi.	98MHz	T001	Distortion Analyzer	Minimum	

#### (4) MULTIPLEX ALIGNMENT

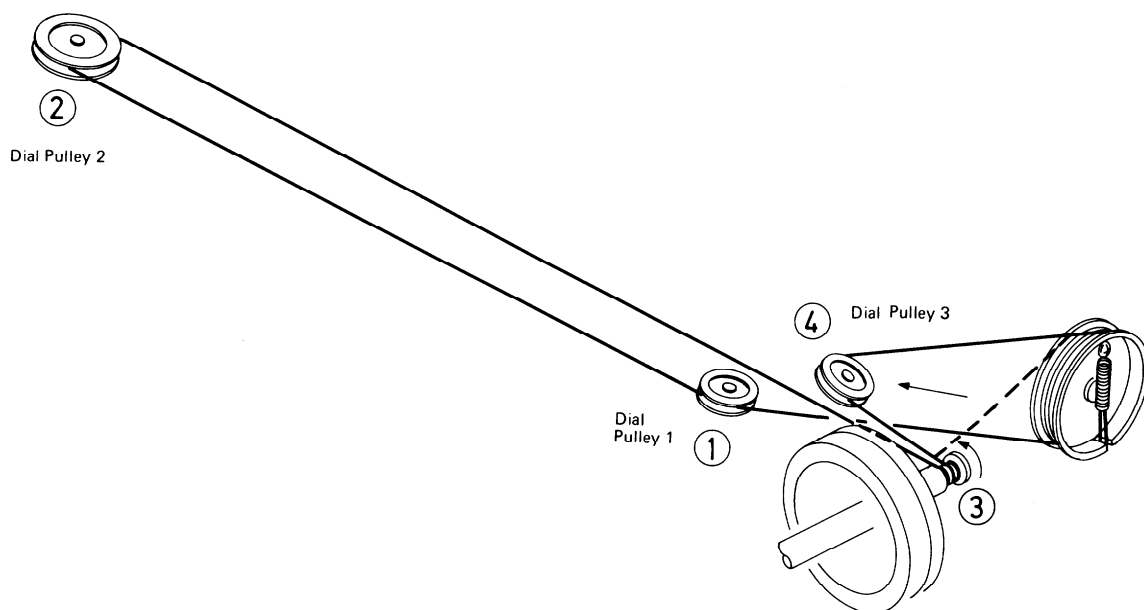


Align-ment	Step	FM Signal Generator	Stereo Modulator	Dial to Set	Adjust	Output Indicator	Adjust for	Remark
V.C.O.	1	98 MHz no mod. 60 dBf (60dB)	—	98 MHz	R146	Frequency Counter	19000±19 Hz	
	2	STEREO INDICATOR should light up when stereo program is being received.						
Separa-tion	1	98 MHz EXT. Mod. 65 dBf (60dB)	Pilot Sig. 9% Main & Sub Sig. 1 kHz Lch 91%	98 MHz	R150	AC VTVM Right ch.	Minimum	Repeat steps 1 & 2 as necessary
	2	Same as above	Pilot Sig. 9% Main & Sub Sig. 1 kHz Rch 91%	98 MHz	R150	AC VTVM Left ch.	Minimum	



## STRINGING DIAGRAM

1. Close the variable capacitor complete and tie the dial cord to the spring of the drum.
2. Thread the dial cord in the direction of arrow from (1) to (3) and wind the dial cord three turns around the tuning shaft clockwise.
3. Wind the dial cord  $1\frac{1}{2}$  turns around the dial drum.
4. Thread the dial cord to the dial pulley 3.





## PRINTED CIRCUIT BOARD (NAAR-507) – PARTS LIST

CIRCUIT NO. PARTS NO. DESCRIPTION

<b>ICs</b>		
Q102	222455	LA1230
Q103	222449	LA3350
Q104	222497	LA1240
Q301,Q401	222451	TA7129P(ONK)
Q501	222016	STK-459

<b>Transistors</b>		
Q001	2210374	2SK19GR(O-1)
Q002	2210380	2SC785(O-1)
Q003	2210393	2SC394(O)
Q101	2210123	2SC380(O)
	2210124	2SC380(Y)
Q105~Q108	2210943	2SC1317(R)
	2211182	2SC1740(Q)
Q109	2210942	2SC1317(Q)
	2210244	2SC735(Y)
Q201,Q202	2211184	2SC1740(S)
	2210086	2SC733(BL)
Q302,Q402	2210975	2SC1344(E)
	2210137	2SC1312(G)
Q701,Q702	2211184	2SC1740(S)
	2210086	2SC733(BL)
Q901	2200113	2SD234(O)
	2200020	2SD234(Y)
Q902	2210747	2SC945A(Q1)
	2210744	2SC945L(Q)

<b>Diodes</b>		
D001	223110	1S2687
D101,D102		
D104,D105	223105	1S1555
D108		
D106	224011	YZ-047
	223943	RD4.7EB
D107	4000022	VD1212
D201,D202	223103	1N60
D701,D905	223858	GP08D
D906	223806	1S1886
D702,D703	223106	1S1554
D901~D904	223842	GP-15B
D907	223915	WZ-150
	223967	RD15EB

<b>Coils</b>		
L001	223106	NFA-3009
	233088	NFA-3001
L002	233103	NFRF-3005
L003	233037	NFT-1501
L004	233090	NFO-3003
L101	233105	NCH-1005
	233024	NCCH-1501
L102	233074	NCCH-1506
L103,L104	233107	NMC-5002
	233021	NMC-8-5
L106	232073	NMO-2008
L107	232057	NMA2523

<b>Transformers</b>		
T001	233085	NIT-0518
T101	233083	NIT-3516
	233101	NFIF-6003
T102	232041	NIT-0509

<b>Ceramic filters</b>		
X101,X102	3010003	SFE-10.7MA
X103	3010004	CFZ455C

CIRCUIT NO. PARTS NO. DESCRIPTION

<b>Capacitors</b>		
VC001	3050004	NVC2-327SA, Variable
TC005	3060003	NTC-10P02, Trimmer
C106	352741001	10 $\mu$ F, 16V, Elect.
C107	352780331	3.3 $\mu$ F, 50V, Elect.
C110	352784791	0.47 $\mu$ F, 50V, Elect.
C113	352741001	10 $\mu$ F, 16V, Elect.
C115	352721011	100 $\mu$ F, 6.3V, Elect.
C116	352780101	1 $\mu$ F, 50V, Elect.
C142	352741001	10 $\mu$ F, 16V, Elect.
C143	352780101	1 $\mu$ F, 50V, Elect.
C145	372321525	1,500pF $\pm$ 10%, 50V, ST
C146	392884797	0.47 $\mu$ F, 50V, LL
C147	392882297	0.22 $\mu$ F, 50V, LL
C148	392883397	0.33 $\mu$ F, 50V, LL
C151,C152	392882297	0.22 $\mu$ F, 50V, LL
C165	372323614	360pF $\pm$ 5%, 50V, ST
C168	352741001	10 $\mu$ F, 16V, Elect.
C169	352741011	100 $\mu$ F, 16V, Elect.
C171	374124737	0.047 $\mu$ F $\pm$ 20%, 50V, DE
C172	352780331	3.3 $\mu$ F, 50V, Elect.
C174	352780101	1 $\mu$ F, 50V, Elect.
C201	352780101	1 $\mu$ F, 50V, Elect.
C203	352761011	100 $\mu$ F, 35V, Elect.
C205	352784791	0.47 $\mu$ F, 50V, Elect.
C207	352734701	47 $\mu$ F, 10V, Elect.
C208	352780101	1 $\mu$ F, 50V, Elect.
C209	352732201	22 $\mu$ F, 10V, Elect.
C302,C402	352750471	4.7 $\mu$ F, 25V, Elect.
C303,C403	352721011	100 $\mu$ F, 6.3V, Elect.
C308,C408	352784791	0.47 $\mu$ F, 50V, Elect.
C309,C409	392883397	0.33 $\mu$ F, 50V, LL
C310	352762211	220 $\mu$ F, 35V, Elect.
C332,C432	374124735	0.047 $\mu$ F $\pm$ 10%, 50V, DE
C333,C433	392880227	2.2 $\mu$ F, 50V, LL
C335,C435	352742211	220 $\mu$ F, 16V, Elect.
C336,C436		
C337,C437	352780331	3.3 $\mu$ F, 50V, Elect.
C501,C601	392880107	1 $\mu$ F, 50V, LL
C502,C602	352733301	33 $\mu$ F, 10V, Elect.
C503,C603	352784701	47 $\mu$ F, 50V, Elect.
C504	352761011	100 $\mu$ F, 35V, Elect.
C505,C605	352741011	100 $\mu$ F, 16V, Elect.
C507	352780331	3.3 $\mu$ F, 50V, Elect.
C701	352780471	4.7 $\mu$ F, 50V, Elect.
C702	352762211	220 $\mu$ F, 35V, Elwct.
C703	352762201	22 $\mu$ F, 35V, Elect.
C904	352784711	470 $\mu$ F, 50V, Elect.
C905	352763311	330 $\mu$ F, 35V, Elect.
C906,C907	352741011	100 $\mu$ F, 16V, Elect.

<b>Resistors</b>		
R146	5225056	N10HR5KBC, Variable
R150	5225018	N10HR1KBC, Variable
R336,R436	5148024	N16RGL250KBT30, Volume
R343	5104046	N16RL100KW30, Balance
R344,R444	5148014	N16RGM100KB30, Treble
R350,R450	5148014	N16RGM100KB30, Bass
R508	451623394	0.33 $\Omega$ , 1W, Metal
R608	451623394	0.33 $\Omega$ , 1W, Metal
R701	441721224	1.2k $\Omega$ , 2W, MOF
R902	441621814	180 $\Omega$ , 1W, MOF
R903	441624714	470 $\Omega$ , 1W, MOF
R507		

<b>Switches</b>		
S801	25030075	NRS-143-30ZV, Selector
S802	25035081	NPS-322-L46, TAPE

# DIAL ILLUMINATION LAMP PC BOARD (NAPL-474) – PARTS LIST

CIRCUIT NO. PARTS NO. DESCRIPTION  
S805 25035080 NPS-222-L45, Selector

CIRCUIT NO. PARTS NO. DESCRIPTION  
210039A 300mA, 8V, Dial illumination lamp

**Terminals**  
P801 25045041 NPJ-6RDBU8  
P802 25045020 NPJ-4PDBL11

**Relay**  
RL101 25065026 L-13

**Shielded case**  
27150056A Front end  
27150057 Front end bottom

## NOTES:

### 1. Capacitors

LL: Low leakage current type electrolytic capacitor

DE: Non-inductive polyester film capacitor

ST: Polystyrene film capacitor

### 2. Resistors

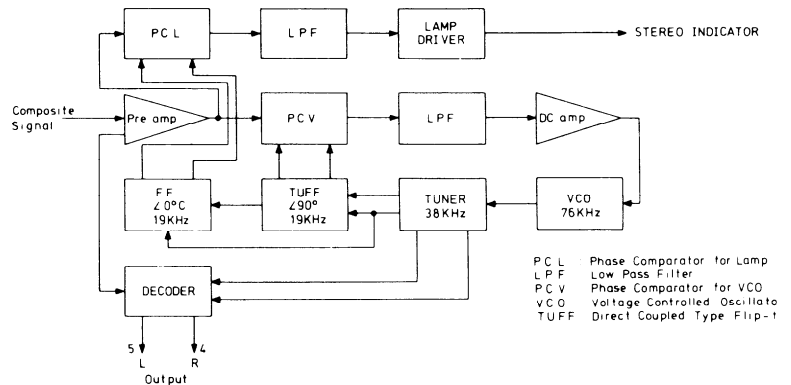
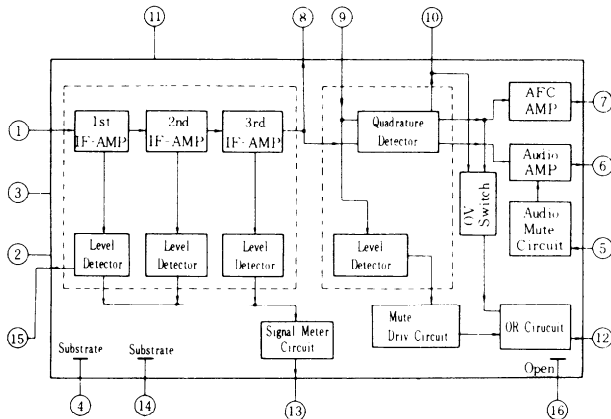
MOF: Metal oxide film resistor

MO: Metal oxide resistor

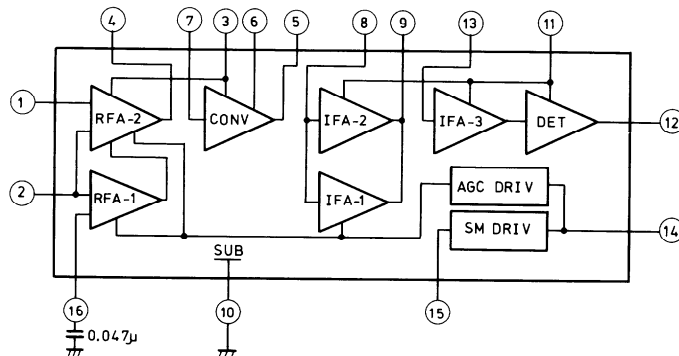
## BLOCK DIAGRAM

LA1230 (QUADRATURE DETECTOR AND FM IF IC)

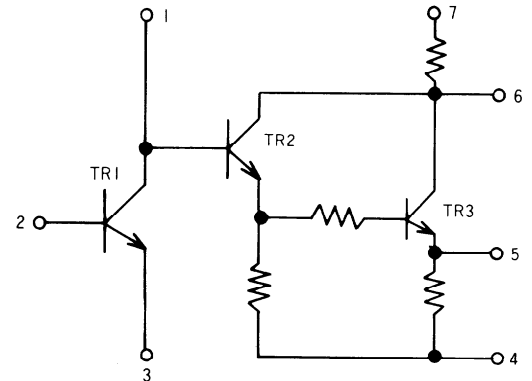
LA3350 (PLL MULTIPLEX DECODER IC)



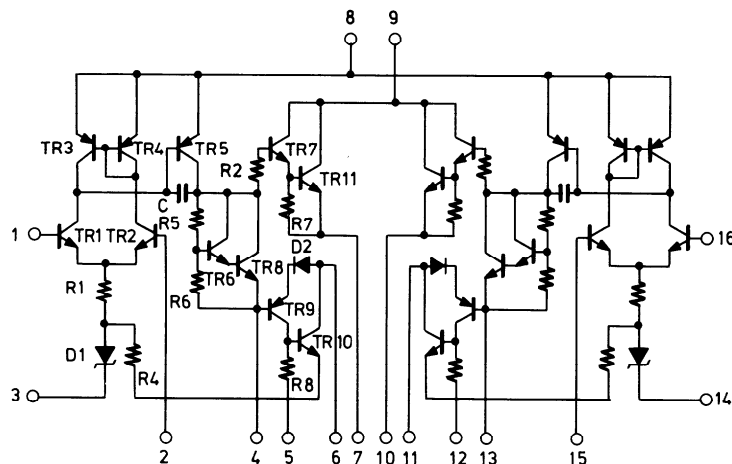
LA1240 (AM IC)



TA-7129P (ONK) (EQUALIZER AMPLI. IC)



STK-459 (POWER AMPLI. IC)



FM 300Ω  
AM  
FM ANTENNA  
L001 ANTENNA  
Q001 RF AMP  
Q002 MIX  
X101 IF FILTER  
Q101 IF AMP  
X102 IF FILTER  
Q102 FM IF AND DET  
Q103 MPX DECODER  
Q104 AM IC  
Q105 GATE CIRCUIT  
Q106 LOCKED LAMP SWITCH  
Q107 AFC SWITCH  
Q108 TUNED LAMP SWITCH  
Q109 MONO STEREO SWITCH  
Q201 HUM AMP  
Q202  
Q301 EQ  
Q401 EQ  
Q501 POWER AMP  
Q701 T.K.C.  
Q702 T.K.C.  
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Q1000

REC-1  
PLAY-1  
REC-2  
PLAY-2  
REC-1  
PLAY-1  
REC-2  
PLAY-2  
PHONO-L  
PHONO-R

SIGNAL STRENGTH  
METER

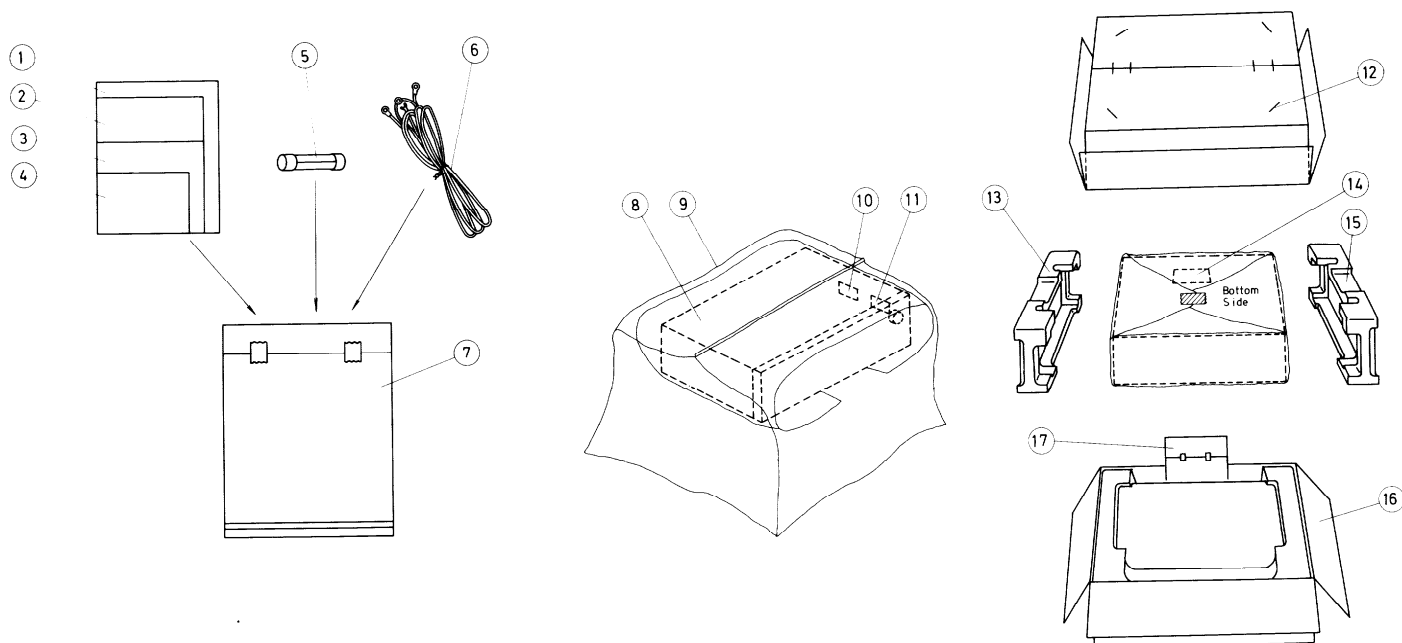
VOLUME  
BALANCE

HEADPHONE  
SPEAKER TERMINAL A  
SPEAKER TERMINAL B

AC 120V 60Hz

1-AM, 2-FM, 3-PHONO  
1-OFF, 2-ON  
1-OFF, 2-ON  
1-ON, 2-OFF  
1-STEREO, 2-MONO  
1-OFF, 2-ON  
1-HIGH, 2-LOW  
1-OFF, 2-A, 3-B, 4-A+B  
1-OFF, 2-ON

# PACKING PROCEDURES



## PACKING PROCEDURES – PARTS LIST

REF. NO.	PARTS NO.	DESCRIPTION
1.	29340276	Instruction manual
2.	29358001	Service station list
3.	29355046	Caution card for 4
4.	29365003	Warranty card
5.	252025	2.5A-T, Fuse
6.	292064	FM antenna
7.	29100006	350 x 250mm, Poly bag
8.	29095026	330 x 900mm, Protection sheet
9.	29100018	650 x 750mm, Poly bag
10.	282969	Caution card A
11.	29360197	Cabinet composite label
12.	282301	Sealing hook
13.	29090187	Pad (R)
14.	293041	Caution label
15.	29090188	Pad (L)
16.	29050198	Carton box
17.	13679119	Accessory bag

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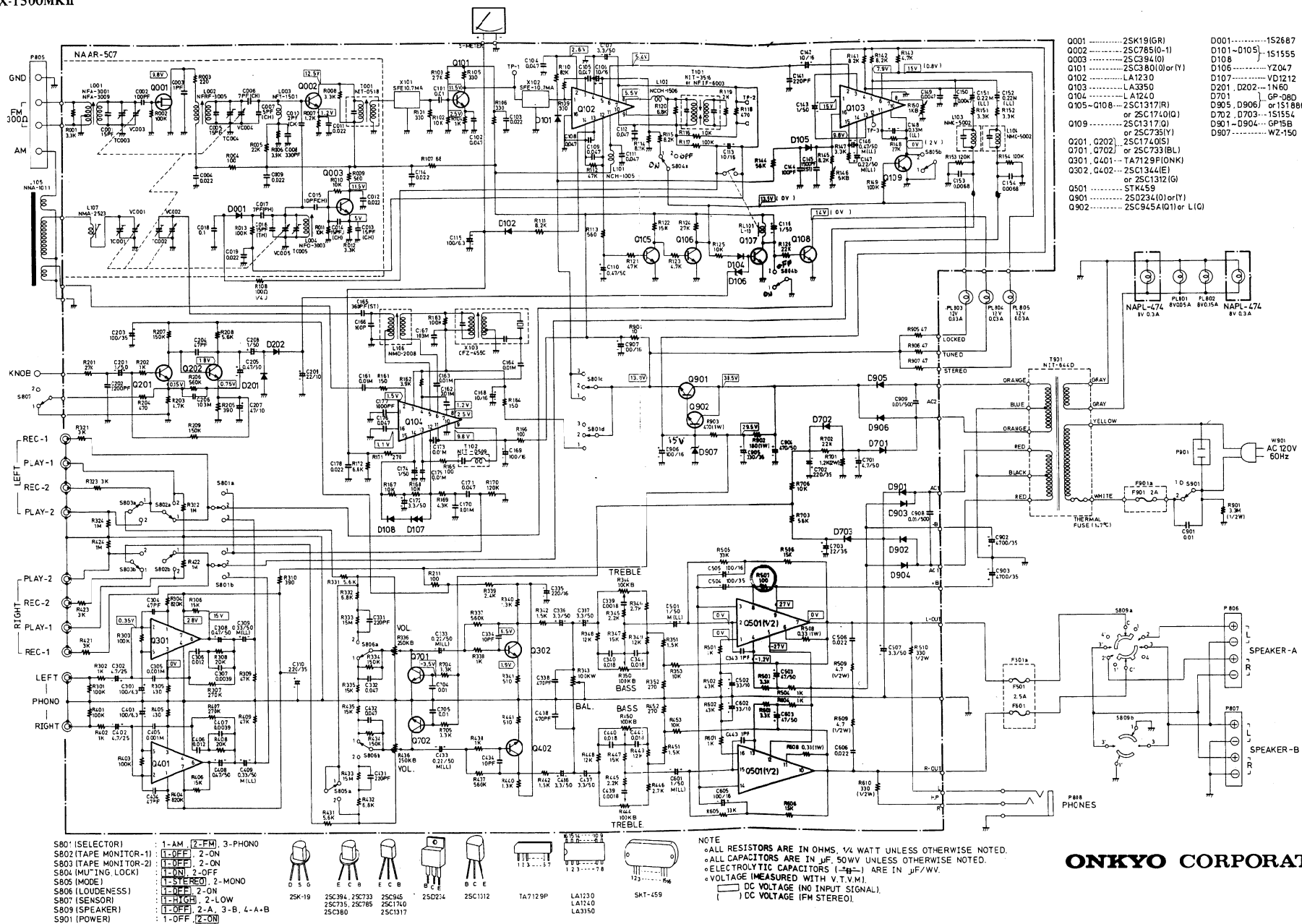
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# SCHEMATIC DIAGRAM

## MODEL TX-1500MKII



**ONKYO CORPORATION**